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VERBAL CONCEPT "MEDIATORS" AS SIMPLE OPERANTS

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A series of experiments is summarized, in historical rather than logical order. The results of these experiments indicate that one type of verbal operant, the notate, a discriminated verbal response[1] by a subject to stimuli experimentally presented, occurs in at least four kinds of situations, "concept-identification," "problem-solving," "association" and "conditioning." In two of these it becomes chained with other such operants, to form the notant—a fuller verbal statement about the environment, or the monent—a self-administered instruction, that is, an S^D for further behavior. All three classes of operant, each behaving slightly differently from one another in behavior, seem to constitute the behavioral basis of statements about "hypotheses." Unlike "mediating responses," or "processes," these verbal behaviors are not theoretically inferred, or indirectly manipulated, but rather are subject to direct experimental investigation. The relationship of their strength to the strength of the behaviors that they control is demonstrable.

For some years now, problems of "learning without awareness" have arisen in a number of contexts; they have created a theoretical, and sometimes an experimental fuss. Willy-nilly, those who investigate human operant behavior sooner or later are among those involved, whether they have leaped, slipped, or been dragged into the fray. These seem to be the avenues by which participants enter into scientific controversies, as well as into barroom brawls.

The courses of development of these two kinds of controversy are rather similar. They show a certain orderliness. In both, as the dispute rises in heat, and the blows—or experiments—get exchanged at higher rates, the original issue tends to get lost, if there was one to begin with. In the present case, the issue summarizes itself like this:

"You can't," "I can," in progressively stronger inflections. Just what can or cannot be done either has been omitted, or repeatedly redefined, as the controversy has extended itself. It is not surprising that seemingly contradictory results turn up. To this writer, the present dispute, which seems to have something to do with the subject's ability to state experimental contingencies, is a regrettable one. As it has developed it seems to have led to the performance of experiments on inappropriate forms of behavior, and to a proliferation of speculative theory.

By inappropriate forms of behavior, I mean this: the experiments that have been—by now—repeated over and over with only minor modifications are those that have confounded at least two questions, the identification of response classes, and the stability (habituability) of reinforcers. *Saying plural nouns, constructing sentences in the first person, mm-hmm,* and *good* may serve to demonstrate the occurrence of operant conditioning, but they are not necessarily the best choice for experiments on other problems. Statements about whether or not operant conditioning occurs must depend upon the changes in behavior that occur with reinforcement and its withdrawal, and not upon anything the subject may have to say about it. (It should also be superfluous to

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This paper was formerly titled "Unaware of Where's Awareness," a slightly shortened version of which appeared in Charles W. Eriksen, et al., *Behavior and Awareness*, Durham, NC: Duke University Press, 1962, pp. 130-158.

[1]For the usage of the terms response and stimulus, see stimulus (3), in the writers glossary (Verplanck, 1957). See also, Stimulus III (Verplanck, 1954); and Gibson (1960).

point out that the terms "voluntary" and "operant" refer, by and large, to the same behaviors.) Many psychologists, in pursuing thought along these lines, seem to have tended to adopt ever more subtle (but not stringent) definitions of "awareness" and to have introduced theory in inverse proportion to the clarity of their experimental findings. Some seem to believe that if they can somehow demonstrate something that can be tagged with the label "awareness," they have in some sense found an "explanation" for the orderliness of human conditioning.

One would not express discomfort with this state of affairs, if it were not for the fact that this seems, at least to the writer, the wrong time to attempt to use "awareness" as explanatory, or descriptive, of much of anything. The fact is, very little is suggested as to how "awareness," however it may have been defined, can or does control or affect behavior in the first place. Statements about "awareness" as prerequisite to learning have shown little, if any, experimental unity, and the word seems to have become a label indicating an explanatory dead end. However, the issue(s) (??) as they have thus far been stated were resolved, little new information would be added.

The word seems to be associated with a rather special kind of phenomenological approach to behavior. While this may seem somewhat heretical to those phenomenological oriented, to the writer it has always seemed that when the experimental facts get established, their phenomenological aspects seem to take care of themselves.

Some years ago, E.J. Green (1955) remarked that each of his subjects in a discrimination experiment could figure out its correct basis only once. The writer had made much the same observation during human conditioning (Verplanck, 1956). In the latter experiments, many subjects have a good deal to say while being conditioned; some of what they say is to the point. That is, some of it corresponds to the experimenter's rules in conditioning the subject. Both these observations related rather directly to subjects' behavior in a number of exploratory experiments on discrimination and "concept-formation" that the writer had been doing. In these, while seeming to behave in conformity with continuity theory, the subjects always did a lot of "hypothesizing" (again, some of it to the point) a la the Tolman-Krechevsky school. Even the writer, resent it though he may (as a Spencian incrementalist at the time), found that he "hypothesized" when serving as a subject. Self-observation, however, yielded few clues as to what was going on.

The common link seemed to be this: in all cases, the subject could come across the correct rule, the "solution," only once in any experiment. Only once could Green's subjects catch on to the critical dots that were correlated with reinforcement. Only once could the conditioning subjects "catch on" that "touching the nose with the right forefinger" produced a point. Only once could subjects figure out that pictures of *objects that can be used in transport* were to be put in the pile on the right. The correct rule, once said, hung on, the problem was solved (ten successive correct choices), and the experiment terminated.

The "aha" that came is this: in operant conditioning of rats and pigeons, too, the subject is observed to "solve the problem" only once. Thereafter he "applies the solution." In shaping bar-pressing, or key-pressing, the skilled experimenter finds very quickly that he is dealing with a one-trial event. The first bar-press that yields the click of food dropping into the magazine, and then the rat's quick dive toward it (a Guthrian affair), is followed in most cases by another bar-press, after an interresponse time that is no greater than those that are later recorded after 10 or 100 reinforcements. Where this does not occur, it seems that the experimenter, not the rat, made the mistake. We may look back at Estes' paper on conditioning (Estes, 1950). To attain a clear-cut incremental process in bar-pressing, he found it necessary to introduce a second bar; gradual changes in pressing bar 1 occurred while extinction to bar 2 was going on. One might put it this way: incremental processes in conditioning seem always to involve extinction, either of

the response itself to stimuli other than the one the experimenter has chosen, or of a competing response. With proper experimental control, operant conditioning is a "once" affair; subsequent reinforcements serve primarily to maintain it at strength, and to develop resistance to extinction, which might be characterized as "reluctance to give up the solution." At the time these considerations were asserting themselves, the writer was busy defining "response" for a glossary, and was struck both by the restrictions that this empirical definition placed on the kind of behavioral events to which the term applied, and by the extraordinary range of new behaviors which could experimentally prove to be responses, behaving, under discriminative and reinforcing stimuli, in a simple manner.

All this suggested an approach to some of the problems raised by human behavior, and especially by verbal concepts. Let experimental work seek to establish directly how the verbal behavior occurring in an experiment is related to the other behaviors that occur. Verbal behavior, if overt, meets the behaviorist's demands for experimental data, and while they can hardly be expected to bear a one-to-one relationship with concepts of "awareness," "hypotheses," "mediators" and the like used by others, there can be no dispute that they have something to do with at least part of what may be meant by "awareness." So, we sought to make a direct experimental attack upon the problem of how verbal behavior acts under the effect of various environmental conditions, and how it in turn is related to the motor behaviors to which it is, at least linguistically, associated. Just how closely such verbal behaviors may relate to "awareness," must be left to those who are surer than I of what is referred to by the word.

Specifically, we undertook to investigate the "rules"[2] that subjects say to themselves, and "try out" in various experimental problems. So long as these are allowed to remain covert, the experimenter forfeits the opportunity to exert direct experimental control over them. If they are made overt, the experimenter can directly subject them to environmental contingencies, as he can other behaviors. The ways in which they are controlled by antecedent or consequent stimuli can be determined by straightforward and simple experimental methods. We should be able to determine how they occur in response to environmental events, how they serve as discriminative stimuli for other behaviors, and how they alter in strength with reinforcement.

Our first guess was that overt verbal statements of "rules" would prove to be simple operant behaviors, conditionable as are other operants. Preliminary experimentation based on this proposition led to methods that have since been further developed. The first method is a simple one: it requires the subject in a "concept-formation" card-sorting experiment to state aloud, on each presentation of a stimulus-object, the "rule" that he is following in trying to get as many cards as possible correctly placed to right or left. In this situation, where many different possible rules may apply, the experimenter is able to make social reinforcement ("right," or "wrong") contingent either upon the particular statement made by the subject, or upon the behavior that the statement instructed the subject to perform. In either case, he may deliver it after the placement.

Preliminary experiments determined the selection of the stimulus material, and the problem. Stimulus materials which permit the experimenter to choose any one of an almost unlimited number of possible "solutions" proved indispensable. The experimenter must be free to change the "solution" of any problem in midstream—he must be able to make wrong what was previously right, and right what was wrong. He must have far more latitude than provided by, say, the Weigl cards.

[2]Since this paper was given, a monograph (Shepard, Hovland, & Jenkins, 1961) has appeared in which the results of experiments on much more complex problems of the same class are reported. It is encouraging to note that data were gathered on the rules—the notants—that subjects eventually came up with. But no effort was made to determine experimentally their origin, and their history through differential reinforcement. It is the behavior of such "rules" that this paper deals with.

Second, the material must not require the acquisition of names (the acquisition of a single new response to an arbitrary class of events; stated conversely, the acquisition of a new stimulus class. See Shepard, Hovland, & Jenkins, 1962.) Third, the behavior required should not press the subject's immediate memory span.

The Dissociability of "Rule" and Behavior

The results of these experiments led us to choose as the first formal experiment one that seemed to place maximal demands on the proposition that subjects' "hypotheses" are simple operants. We (that is, Stuart Oskamp (1956) and the writer) chose to show that these would occur at a high relative frequency even under partial reinforcement, under conditions where we could also keep track of the behavior presumed to be controlled by them.

Stimulus materials consisted of a set of 110 children's "trading cards"[3] backs of playing cards, each different from all the others. Fifty-five had representation of single objects or figures, and 55 had two or more objects pictured. The subjects' task was, given the cards one at a time, to place each either to the right or to the left. The instructions also told the subject that he could get all of them correctly placed. Three groups of college students were run. Members of all three groups, P, PH, and PH, received the instructions to place each card to either right or left. Two of the groups, PH and PH, received the further instruction to state on each trial the rule followed in attempting to get the card right, before placing it. Members of the first group, P, and one of the latter, were told "right" or "wrong" according to whether they had placed the card correctly by the experimenters rule without regard to the rule they stated in attempting to get all placements correct. Members of group PH were told "right" or "wrong" on each trial after they had placed the card, according to whether they had stated a specific version of the rule followed by the experimenter in reinforcing, regardless of where they placed the card. (In group designations, the underlined indicates whether P (placement) or ("hypothesis") was reinforced.) For all groups, reinforcement with "right" or "wrong" was given only after the card was placed.

In order to assure that any experimental results obtained could not be accounted for in terms of "partially correct hypotheses," only a limited subset of the rules that could produce consistently correct placements was positively reinforced in members of group PH. That is, we shaped a particular set. The rules differentially reinforced for group PH were all of the form:

"Single (one) principal object (figure, design) to the right, two (more than one, several, two, three) principal objects (figures, designs) to the left." If the subject, in stating the rule, *named* the object or objects pictured, he was told "wrong." He had to use an abstract term. Records were kept, trial by trial, both of placements, and, for groups PH and PH, of rules stated.

The procedure was this: acquisition trials were carried out as usual in this type of concept formation experiment (continuous reinforcement of correct responses) until the subjects met the criterion of ten successive correct responses. Thereafter, with no change in procedure, all subjects were placed on a partial reinforcement schedule, in which they were told "wrong" following each incorrect response, and following four out of each successive ten *correct* responses (placements for P and PH; rule statements for PH). On the remaining 60 percent of correct responses, they were told "right." These positive reinforcements were given according to a predetermined randomized schedule.

[3]The tremendous variety in trading cards, on which pictures and designs vary in innumerable dimensions, and which may be further varied, independent of their individuality, by presenting them to the subject upside down, sidewise, or the like, makes such procedures possible. There are an effectively infinite number of possible rules that the experimenter can follow in giving reinforcement, and among which he can shift, whether he is reinforcing monents or placements. Similarly, their variety permits the experimenter to select stimulus materials with considerable freedom and control, although never with the degree of control provided by "artificial" materials, such as the Weigl cards. This flexibility seems indispensable for finding the orderly behavior of our subjects.

The schedule places the correct rule-statement on partial positive reinforcement, and at the same time punishes incorrect rule-statement 100 percent of the time. The strength of correct rule-statement will depend, then, on reinforcement by avoidance, on partial positive reinforcement, or on both. Any of these provides accrual of strength by conditioning processes.

Many statements that subjects in group PH could make would lead them to place the cards consistently in the correct pile (e.g., "one dog, belongs to the right," "two dancers go to the left"), but these were not reinforced, since they did not correspond with the rule-statement required by the experimenter. For members of group P, if such "wrong" statements were followed by placements consistent with them, they would be followed by reinforcement contingent on the correct placement.

The results of this experiment were clear. First, although the mean number of trials to criterion was smallest for group PH, such differences among groups were not reliable. Several subjects in this group first stated a correct rule following three or four consecutive correct placements. But our primary interest is in the behavior under partial reinforcement. Of the placements made by subjects in groups P and PH on reinforcement trials 51 through 100[4] following the ten trials in the criterion run, 60 percent were reinforced, and for PH 58.9 percent of correct placements followed instances of the correct rule that were reinforced. The percentages of correct placements under partial reinforcement were, respectively, 71.2, 71.8, and 76.8, which differ significantly from chance (50 percent), but not from one another. On the 23.2 percent of the trials on which members of PH made *incorrect* placements, these subjects were reinforced 43.9 percent of the time; that is, with 4 of every 10 *incorrect* placements, they stated the *correct* rule, the one for whose statement they were being reinforced. More striking are the percentages of trials on which (a) the *correct* rule, (b) rules that were incorrect, but yielded correct placements, (c) rules that related to the objects pictured, rather than to other features of the stimulus material (borders, colors, realism, and the like), were stated by members of PH and PH, the two groups giving the rules on each trial. These are summarized in Table 1.

Table 1
Percentages of trials 51 - 100 on which members of groups PH and PH stated each of four categories of rules.

Category of Rule Stated		Group PH	GroupPH
(1)	Correct rule	30.2	92.2
(2)	Other version of rule that would yield correct placement consistently	18.2	2.0
(3)	Incorrect rules that named object depicted	17.2	0.2
(4)	All others	34.4	5.6

The data of the table indicate clearly that the rule that has been, and continues to be differentially reinforced, occurs at high relative frequency. Its relative frequency is higher than that of the behavior it is presumed to control. Although PH subjects state the correct rule on 92.2 percent (and one or another version of it on 9.2 percent) of the trials, they place the cards correctly on only 76.8 percent of the trials. In other words, they do not place the card where they say they are going to on 17.4 percent of the trials. Group PH, however, states the correct rule, or a version of it, on 48.4 percent of the trials, but places the cards correctly on 71.8 percent—a discrepancy of 23.4 percent in the *other* direction. The rule-statement, and the behavior for which it is presumably a discriminative stimulus, have been dissociated by manipulating their contingencies of reinforcement.

In a later experiment by Rilling (1962) on the reinforcing properties of "right" and "wrong," one group underwent an experimental procedure which replicated that of group PH. He obtained results almost identical with those of Oskamp (1956): on 72.8 percent of the trials, the placement was correct; on only 57.1 percent of the tri-

[4]Through the first 50 trials, the percentage correct drops from 100 percent to an asymptotic value. The rate at which this occurs varies from subject to subject, evidently as a function of differences in the aversiveness of the socially presented "wrong."

als was any version of the experimentally correct rule given.

The results may be summarized as follows: under partial reinforcement, the statement of a specific rule retains considerable strength, as do simple operants. The strength is, in fact, greater than that of the behavior that the rule is presumed to control—here, the placement of a card. Where reinforcement is contingent on placement, a higher percentage of correct placements occurs than can be accounted for by correct rules. Experimentally, the subject's rules, his "hypotheses," can be dissociated to a degree from the behaviors that they are presumed to direct. He does not carry out his intentions.

The Moment

In fairness both to theorists, and to the conceptual system within which this experiment was done, it is now necessary to introduce a term for these *statements-of-a-rule* by our subjects. They must be distinguished from the "hypotheses," referred to in many theories and from the rules followed by the experimenter in conducting the experiments. The term chosen is "monent," derived from a Latin verb meaning "advising, guiding, or directing," and it is "monents" that now become subject to a number of experiments aimed at determining further how subject's verbal behavior acts in controlling others of his behaviors. The outcome of this experiment leads, also, to further methods of investigating such verbal behaviors, and hence to data that have shown their status as operants, their discriminative stimuli, and the kinds of events that reinforce them. For clarity of exposition, we will reserve the words "rule" and "principle," for the rules followed by the experimenter. Let me summarize very briefly a variety of experiments, in the approximate order in which they were done, with a brief account of the immediate context in which they were performed. All of them are based upon the experimental method of shifting the basis of reinforcement from monent to monent, from monent to placement according to one or another rule, from placement to placement, and back again.

A. *Extinction and recovery.* In order to determine how monents behave under extinction, we performed a number of experiments using the same stimulus materials, the same set of instructions as those given to groups PH and PH, and the same general method.[5]

A simple demonstration comes when one gives the subject instructions to state the rule he is trying before each placement, and then tells him "wrong" on every trial. Latencies of monents increase progressively, more and more improbable monents occur when they are finally given ("can be used to carry opium" is the writer's favorite—they sound like something useful for a projective test!), and finally the subject gives up—"I can't think of anything else;" "my mind's a blank," and so on. Only very rarely does a subject come up with the one paradoxically reinforceable monent: "*Anything* I say is going to be wrong!"

Extinction with spontaneous recovery occurs when the experimenter delivers reinforcement according to the following rules: reinforce five consecutive times the *second* monent stated by the subject (i.e., the monent first stated by the subject on the second trial): extinguish this monent thereafter, but give five consecutive reinforcements to the second *new* monent given after the last instance of the first reinforced monent. Repeat this shift in reinforcement two more times until each of four different monents has received five consecutive reinforcements, *then* shift to reinforcement of placement according to a rule that does not correspond with any of subject's monents. Under these conditions, subjects will eventually reach the criterion

[5]Many of these effects can be obscured by averaging the data of subjects. It is the individual subject whose behavior is orderly. Combining the data of many subjects serves not only to force discontinuous data into a guise of continuity, but it also yields a degree of variability that leads one to seek "significance" by placing more and more subjects in each group, rendering it still less likely that he will either observe carefully the behavior of any one individual, or sharpen up the experimental design. Subjects do differ from one another, and in ways that make group data treacherous.

of 100 percent correct placement, but the monents they state typically resemble closely the initially reinforced four. These recur, to be re-extinguished and again to recover spontaneously. The subject often is never able to state the rule followed by the experimenter in reinforcing placements, even though he reaches 100 percent correct. Under these conditions, subjects may take several hundred trials to reach solution.

B. *The monent as a chain of responses.* The protocols of this and of similar experiments show that the monent is a chain composed of two responses, made up of a word or phrase descriptive of the card, the "notate," linked to an instruction, the "predocent" such as "put to the right," or "goes to the right." A notate may not recur after single reinforced occurence. If the subject says "people go to the right," and gets no reinforcement, he is not likely to try the logically expected "people go to the left;" he is more likely to say something such as "cards with blue go to the right." The two parts of the monent thus may be separated; their initial strengths differ greatly, as does their resistance to extinction.

A *notate* (Latin—roughly translatable as "what has been observed") is defined as follows" any word or phrase given in response to a stimulus or to an object incorporating stimuli. Notates can be further characterized as "descriptions," "associations," "discriminated responses," "descriptive characteristics," "categories" or even, "verbal percepts." Notates are stimulus-controlled and are symbolic of one or another feature of the stimulus. They are synonymous, then with Skinner's (1957) *tact*. The second part, "put to the right," "goes to left" termed the "predocent" (roughly "instructing beforehand"), is defined as a verbal response that is an S^D for motor behavior. (One might expect that there would be a third member of the chain, "is correct." Such occur very rarely.)

C. *Some response equivalences, and lack of them.* In some experiments, subjects have been permitted to say "same." If, after a series of "sames," the subject is asked what "same" means, he gives the monent last stated. That is, the subject's "same" can be believed, and reinforcing "same" gives results identical, insofar as can be determined, with those obtained by reinforcing the last previously stated monent itself. Another effect should be noted: reinforcing "borders go to the left" is *ordinarily* equivalent to reinforcing "nonborders go to the right." Under some circumstances in placement reinforcement, which we would hesitate to try to characterize as yet, the two may be dissociated, and the subject may systematically say, "borders to the left," and "animals to the right," depending on the stimulus card presented. That is, monents may adventitiously become differentially reinforced with respect to stimuli. The effects of the adventitious reinforcement of "borders" when presented with cards having *borders* are not incompatible with those of the adventitious reinforcement of "animals" to cards with *animals*, and to cards with both *borders* and *animals*.

Again under circumstances that have not yet been determined, subjects may show a perfect discrimination for placements to the right, and show no discrimination of placements to the left, without respect to the strength of any monent. In these cases, some cards that belong on the right are being put to the left, and the S^D is a subclass of the stimulus the experimenter has chosen.

D. *The discrimination process: extinction of placements to* S^Δ. Further analyses were made on the data obtained on individual subjects in groups P and PH of the initial experiment, and on subjects in other experiments following similar procedures. In these, cumulative frequencies of placements to the right are plotted as a function of cumulative instances of (a) S^D (i.e., the class of cards that belong on the right according to the experimenter's rule) and of (b) S^Δ for this response. A similar pair of curves is plotted for placements (the two S^Δ -R curves) fall off in extinction curves. Under PH instructions, the correct monent tends to occur for many subjects only after considerable extinction has taken place. When this occurs, the extinction process is "short-circuited" out, and the extinction

curve takes a slope of zero at once. But considerable (and recoverable) resistance to extinction for either R in the presence of their S^{Δ}'s remains, to reveal itself in "careless errors."

These results emphasize the fact that monents are *not* discriminated, but once they occur correctly, may be reinforced on every trial thereafter, whereas placements to the right, or to the left, can be reinforced only when their discriminative stimuli (cards that go to right, and to left respectively) are presented. *Placements* seem governed by Spencian laws, based on differential reinforcement with respect to two sets of stimuli, that is, with reinforcement of correct, and nonreinforcement of incorrect responses with respect to their stimuli. The correct monent, by contrast, as in simple operant conditioning, is reinforced on every trial, irrespective of the particular stimulus presented, and single reinforcements yield immediate repetitions. *Both continuity and noncontinuity theories are substantially correct—but for different behaviors. But unless reinforcement of monents is experimentally distinguished from that of placements, the correct monent will "take over" as soon as it occurs, and will obscure the gradual development of a discrimination.*

E. *Differential reinforcement of monents.* It should be possible to place monents under discriminative control by making reinforcement of a particular monent contingent upon the presence of a particular discriminative stimulus. Thus, S^{D} (as, experimenter leaning forward, or the card presented sidewise) "people to the right, nonpeople to the left" can be reinforced, and under S^{Δ} (experimenter sitting up straight, or the card presented straight up and down) "cards with borders go the right, nonborders to the left." (This is evidently the "conditional hypothesis.") Experiments of this sort were done, and, the expected discrimination curves for the monents were found.

F. *Manipulability of availability of monents.* When subjects are used in a series of experiments, with the reinforced monent varied from time to time, there are large transfer effects. Initially improbable monents may appear *first* in a new experiment, if it has been reinforced in an earlier one. Subject's repertory of monents, and their relative probabilities, may be manipulated over a wide range ("salience").

G. *Covert monents.* It should be emphasized that no assertion has been made that the spoken monent is the *only* verbal behavior involved. Subjects show many signs of covert verbal behavior, and much of this becomes overt when the experimenter asks question. The subjects' answers often yield additional notates and monents different from what was given aloud, or give elaborated versions of the overt one: ("I was wondering if it had something to do with alternate piles, too," or "It may be a particular *kind* of people.") These previously unstated monents (where the subject is not following the experimenter's instruction to him) may pick up a few reinforcements adventitiously.

The final experiments of this series deal with covert monents directly.

H. *Conditioning of covert monents, as superstitions.* An experiment was designed to determine whether a covert event that corresponds in its behavior with the monent occurs. Subjects, run together in sets of five before an audience, have been given the following instructions: "You will be shown a series of pictures. Following a simple rule, some of them are plusses, and some minuses. Your job is to find the rule that makes each card a plus or a minus. On each trial, write in your data book whether you think the picture is a plus or a minus, and you will be told whether you are right or wrong each time. When you think you know what the rule is, put a check next to your answer on that trial. When you are certain what the rule is, put a double check." The subjects were then individually reinforced according to a arbitrary prearranged schedule, independent of their overt response, although the individuals delivering the reinforcements went through the motions of looking at them, before saying "right" or "wrong."

On trials 1, 3, 4, and 7, all subjects were told "wrong." On all other trials through trial 30, all subjects were told "right." Over

the next 12 trials (el-42), one of each set of five subjects was told "wrong" once, another 3 times, another 6 times, another 9 times. On the other trials, all were told "right." In each set, one control subject remained on continuous reinforcement, that is, he was told "right" on every trial past 7. All subjects were then continuously reinforced for a further 28 trials (to a total of 70). At the end, the subjects were asked to write down the rule that was correct, and how sure they were of it, and, if the rule changed, to write down the second rule, and how sure they were of it. This procedure has been replicated a number of times.

In this procedure, then, reinforcements occur—are "shot in"—at times when a monent should have occurred covertly, but the reinforcement was independent of what the monent might be. Monents could be conditioned, then, as "superstitions." The results indicated that covert monents occur, and that they behave under reinforcement as do overt ones.

1. Every subject reported at least one rule of which he was "certain" or "very sure." The relative frequencies of the monents that were conditioned correspond with those observed of overt monents before differential reinforcement (animals, people, borders, realistic, upside down, single versus plural, and the like).

2. For the 18 subjects who followed the instruction to check and double check, a median of four consecutive reinforcements (range 1-14) preceded the trial on which they reported that they "thought they knew what the rule was," and a median of five more reinforcements (range 3-22) made them "certain," or "very sure." Of those subjected to partial reinforcement through trials 31-42, an insufficient number of subjects made checks, so that no results can be reported.

3. A single nonreinforcement seldom extinguishes or alters the correct monent after it has been on continuous reinforcement for some time. In general, the greater the number of nonreinforcements, the more different the second covert monent from the first.

Table 2
Number of changes in monents reported as a function of number of nonreinforcements through trials 31-42.

Kind of Change	Group (N = 25) No. "Wrongs" Trials 31-42	A 0	B 1	C 3	D 6	E 9
None		5	2	1	1[a]	0
Minor change[b]		0	3	3	2	2
Complete change[c]		0	0	1	2	3

[a]The subject wrote: "red in background, +. Changed in middle (of series), and went back to original."
[b]Minor changes include (a) simple reversals, additions (original: "persons = +; then persons with horses =+"), contractions (original: living things +, then animals and flowers +), expansions (originals: "animals negative" to "live negative").
[c]Complete changes: no relationship between first monent and second, e.g., "borders +, to animals +," and "animals and humans +" to "photos."

4. At the end of the series of 70 cards, every one of the 25 subjects reported being certain of the first rule. Every subject who reported a change in the rule, was either "sure" or pretty sure" of the second rule as well.

We may state with confidence that monents occur covertly, and that they are then subject to the same laws of reinforcement as when they are overt.

In all these experiments, the behavior of *individual* subjects was orderly to a high degree; subject's "thinking" came under experimenter's control in very much the way the behavior of a rat does when a response is being shaped. On the other hand, questioning a subject at the end of these experiments on what he was doing, or what he thought he was going on, or how he solved the problem, yields a good deal of verbal behavior that usually corresponds poorly with what the subject had in fact been doing, or how frequently he had been reinforced. It reflects very seldom the environmental variables whose control led this subject to behave as other subjects do under the same procedure. What the subject answers to such questions seems to be most closely related to his behavior over the few trials immediately prior to the

questioning, and suggests a short-range "immediate memory." Rationalizing, not reasoning, seems to be the appropriate term. The statements recall the flavor of the introspective protocols given by subjects in the functionalists' experiments at the beginning of the century. One can hear and see what led Watson to behaviorism.

The Notant

In the preceding experiments, the experimenter was limited by the fact that he had to keep track of, and record, two kinds of behavior—the monent, and either card-placement, or writing + or -. Moreover, in delivering reinforcement, there was inevitable the ambiguity that both placement and monant could be reinforced on any one trial (the ambiguity is evident to remarkably few subjects). A new procedure was therefore developed that eliminated one of the two behaviors, and hence the ambiguity. It enabled us to study the verbal behavior alone.

The subject is presented with two side-by-side piles of cards, picture side down. These have previously been sorted by the experimenter according to some rule or sequence of rules. The instructions are: "All the cards on the right differ in a systematic way, that is, in the same way, from all the cards on the left. Your job is to turn the cards over, a pair at a time, and for each pair tell me the rule that you think distinguishes all the ones on the right from all the ones on the left. I'll tell you whether you are right or wrong." By stacking the cards, the experimenter can arrange for several rules to apply successively for fixed numbers of trials, thus providing the experimental conditions for extinction, counterconditioning, and the like.

A. *The notant: a chain of notates.* As with the monent, the verbal behaviors, such as "cards with blue showing are on the right," constitute a chain. As with the monents, a single nonreinforced occurrence usually eliminates the notate that is the first member of the chain (and the subject does *not* say "cards with blue are on the left"). From this fact, and from the fact that these statements do not direct the subject to do anything further, it becomes necessary to distinguish between these chains and monents. The first member of both, the discriminated verbal response to a feature of the card "blues," "girls," "single object," is a notate. The second number for monents is the "predocent," which "tells the subject what to do." The class of verbal chains which state an order in the environment, are termed *notants*. Their second member is a "predicant," roughly translatable as "predicating something about the environment," which is defined: a verbal response to a notate, incorporating one or more other notates. The notants in the present series of experiments are all of the sort—"cards with borders are on the right," or "the right pile includes all the bordered cards." *Border* and *right* are notate and predicant respectively. The distinction between predicants and other notates is an operational one; in these experiments, the stimuli for the predicants are presented on every trial. Those for other notates need not be. The order in these chains is a matter determined largely by grammatical constraints and is often of no great importance.

B. *Reinforcement by confirmation.* Initially, in these experiments the experimenter told the subject "right" or "wrong" following each notant. It soon became obvious that he need say nothing, and that the instructions could be changed. A notant shows the effects of reinforcement (one-trial change in response probability, and progressive-with-trials increments in resistance to extinction) as a function of the pair of stimuli presented to the subject on the following trial. If these stimuli elicit the notant given on the previous trial, they reinforce it. Such *confirmation* does not differ in its control over behavior from social reinforcement "right" and "wrong," except quantitatively (*vide infra*, D). *A confirmation is a reinforcing stimulus.*

C. *Social vs. confirming reinforcement.* In some experiments on notants, the experimenter's "rights" and "wrongs" were given in contradiction to the reinforcement (by confirmation) given by the prearranged stacking of cards. These results are

of importance in their own right, since striking individual differences in behavior are observed under these conditions. Some subjects under these conditions are controlled primarily by the social reinforcers, and others ignore these, and behave in conformity with the nonsocial confirmations.

D. *Relative availability of notants.* It was found possible to arrange the cards so that the availability of a given notate can be varied through a considerable range. This is done by arranging the cards in each of the two stacks in the order of ascending, or descending, probability that each will elicit the experimentally correct notate and no others. (E.g., border vs. no-border is ordinarily a very difficult notate. However, it may be produced on trial number 1 by presenting the subject with a pair of cards about which there is nothing to say but "border," that is, two blank cards, one with a border.) The availability of a particular notate (which it will now be evident is almost identical with "concept") proves to be a simple function of the sequence of environmental events, and of the subject's previous experimental history. It is readily manipulable by the experimenter.

E. *Extinction.* In these experiments, *non*reinforcement of a notant can be carried out by one or another of a number of different operations. Let us say the notant is "flowers on the right, nonflowers on the left." Nonreinforcement of this notant can be associated with (a) systematically presenting a flower on the left, and no flower on the right, (b) systematically presenting no flowers at all, on either side, (c) systematically presenting flowers on *both* sides, and (d) having the two decks randomized with respect to flowers. All four procedures yield extinction curves, but it has not yet been determined whether the last three produce results different from one another. The first of the four counterconditions a new notant—"flowers on left" (cf. B, under Monent). The *notant* continues to be reinforced; this corresponds with the "reversal shift," which seems to puzzle some theorists. With b, c, and d, the cards may be stacked so that a notant which incorporates a new notate can be conditioned.

F. *Counterconditioning.* In experiments where a new notant is subject to reinforcement as the previous one undergoes nonreinforcement, the distinguishing notate drops out for a time after only one or two nonreinforcements. The full characteristic extinction curve of the first is obtained only over a long series of trials during which the second notant occurs on each trial and is continuously reinforced. In this case, after a number of trials, subjects often "tack-on" the extinguishing notate, as follows: if "cards with borders on the right" was reinforced, then extinguished and "cards with blue showing on the right" then conditioned, subjects will, for example, say, when a card with both blue and a border appears on the right, "blues on the right, and there's a border."

When the second notant undergoes extinction, still more instances of the first notant recur.

G. *Functions of the number of reinforcements.* Resistance to extinction, the number of unreinforced responses that occur after the termination of reinforcement, is a function of regular reinforcements, here as in other conditioning. The subject's "certainty" is *also* a function of this number. After three or four consecutive reinforcements the subject is "pretty sure." After three or four more, he is "very sure," or "certain." Quantitative data of a sort may be obtained by asking the subject after each consecutive pair, or after a given number of regular reinforcements, how much he would be willing to bet that the next pair will conform with his notant.

H. *"Refining" the notant.* When the experimenter has applied *two* principles in stacking the decks (cards with both borders and people to right, cards with neither borders nor people to left), many subjects, when one of the two notants has been conditioned and is under continuous reinforcement, will stick with the first one, unmodified. A few subjects will, after a few more trials, emit the second notate *as well,* while the first is still under regular reinforcement. Some of them speak of this

as "refining my hypotheses." Further experimental work is needed before we can determine under what conditions, and with what kinds of subjects, the latter highly adaptive behavior may be expected to occur.

I. *Notants and monents.* In general, subjects arrive at an experimentally correct notant far more quickly than they do the experimentally correct monent. This is true even when the difference in the number of cards presented per trial is taken into account. This finding is consistent with the observation that bystanders watching a subject perform in a concept-formation experiment of the card-sorting type often get the concept more quickly than the subject himself. The bystander is more effectively reinforced through observation of the cards that the subject has placed to right or left than the subject is by his own placement of them, and the differential social reinforcement he receives.

The Notate, Isolated

Concerned that the orderliness of the data obtained in these experiments might depend upon the particular stimulus-material used, and on the instructions given by the experimenter, we sought a very different kind of material that could be used in similar experimental manipulations. More particularly, we wished to deal with simple notates, unchained with other responses. Such material has been used by Underwood (1957), who compiled lists of words illustrating concepts, and has done experimental work utilizing them. As a result, we found ourselves in the area of word-association. With the new material, a still further simplification of the experimental procedure proved not only possible, but desirable.

The experiments that follow are all based on the use of stimulus material that is made up of sets of words, ranging in number from 20 to 50. Each set lists words that are the names of objects that have a single common property (objects that are *round; rectangular; made of wood; made of paper,* and so on).

On the basis of the work of Bousfield and others (e.g., 1953), all the words of each list should have some measurable probability of eliciting the same word (the "concept") in a word-association experiment. "Orange," "wheel," and "clockface" are all likely to yield "round." Initially, on a systematic basis, and now on an experimental one, these verbal responses have been identified as notates, and a concept is recognized as that class of stimuli all of which control the same notate. The name of the concept is given by the notate controlled by it.

The first experiment was the simple and obvious one, essentially replicating experiments that had already been done, but in a context, and using methodological details, that were new. The subjects were (individually) instructed as follows: "I will read you a list of words, all of which have something in common. Your job is to figure out what they all have in common. After each word, tell me what you think the common element or feature is, and I will tell you whether you are right or wrong." In these experiments, the subject's behavior shows nothing that was not already familiar from the previous sets of experiments on notants.

As before, social reinforcement proved unnecessary; reinforcement by confirmation, given by the occurrence of a second word eliciting the same notate was similarly effective in (a) altering the probability of response after its first occurrence, (b) building resistance to extinction, (c) progressively building subject's certainty that he is "right," and (d) increasing his tendency to five the same notate to an initially ineffective or weak stimulus for it.

By arranging words in order of notate probabilities, the number of trials required by the subject to reach the correct notate can be varied up and down. Lists can be "stacked" as were the cards in the previous experiments. (See Appendix A.)

Two classes of notates occasionally occur that are almost impossible to extinguish. The first is one so general that it is available as a response to almost any noun, e.g., "useful to humans." The other class of undisconfirmable notates are words that

are inexact in their level of abstraction. One subject (a psychologist) given list A of the Appendix, and immediately thereafter list C in reverse order, gave "container" to the second stimulus word, "barrel." After the seven ensuing reinforcements of "container," "cigarette" yielded: "Container—contains air." The identical response was given to "wheel." Clock face "contains time." Objects thereafter contained food value, atoms, merit, and so on. A fascinating performance.

The effects produced when social and environmental reinforcement are given in contradiction to one another replicate those of the previous experiments on notants.

Altogether, these experiments confirmed the generalizations that had been arrived at, and rendered it most improbable that they were not artifacts of the specific stimulus materials that had been used.

The use of word-lists suggested further and illuminating experiments.

A. *Notates and word-associations.* When a subject is presented with a list of words, all members of one concept, but is instructed that this is a word-association test and that he is to say the first word he thinks of as soon as the word is pronounced, there seems to be a tendency for the correct notate to occur more often toward the *end* of the list. If, at the end of the list, the subject is told—"All the words I gave you were of the same sort: they were examples of the same kind of thing. "Did you notice? What were they?," most subjects are *immediately* able to state the concept. (Subjects who cannot state it immediately do so after one or two words of the list when the list is now reread.) With no instructions to do so, they have "solved the problem"—which had not been stated. The mere presentation of a series of stimuli all of which control the same response, alters the probability that the response will occur.

In an elaboration of this experiment, a group of 36 high school students was given a "word-association test," in which four stimulus lists of 25 words each were given ("red," "footwear," "food," and "furniture"). Each word was spoken 6 times consecutively, at 4 second intervals: thus, up to six responses could be written to each (most subjects were able to give six consistently). After all the responses had been made, subjects were told that all the words on each of the four lists illustrated different concepts, and were asked what they were. Table 3 gives the results.

These results show that subjects do indeed find concepts, even when not instructed to do so.

Table 3
Concepts reported following "Word-association test."
(N = 36)

List 1 ("food")		List 2 ("footwear")		List 3 ("red")		List 4 ("furniture)	
food	32	clothing	7	accident (injury, violence, death)	13	furniture	25
soft food	1	shoes, footwear	7			household, articles	2
gooey, (oozy)	2	travel	3			comfort, relaxation	4
none	1	weather	2	red	10	home	2
		sports	2	color	3	misc.	2
		misc.	10	misc.	7	none	1
		none	5	none	5		

Examination of the data sheets reveals the word associations that compelled such correlated concepts. They show that the concept acquired by each subject is typically determined by his most frequent response, and that occurrence of a response increases its probability of occurring again. The "erroneous" concepts given by these subjects were produced by their *most frequent* responses.

This is best seen by the concept "accident, injury, violence, death" of the third list. The first word of this list was "blood," to which the great majority of college students give, as their first response, the word "red." The second word was "stop-light," the second most effective, for college students, in producing "red." When presented in this order to the 36 high school students in November 1960 their first responses to "red" were given as in Table 4. When the subjects went on to "stop-light," they frequently produced "police car," "arrest," and related words. Having responded with words associated with crime, they tended to continue to do

so. (Many "misheard" the word "radish" as "ravish," and responded accordingly.)

Table 4
Frequencies of notates to the word "blood"
N = 36; High School students.

red	15	kill	1	accident	1	murder	1
Psycho	5	nurse	1	vampire	1	bring	1
cut (s)	4	drip	1	death	1	miss	1
fight	1	ugh	1	football	1		

It is not surprising that 13 of the 36 identified the concept, in retrospect, as Table 3 shows.

Quite clearly, the concept they "get" is the response they have just made most frequently. With "concept" instruction, this same list is gotten 100 percent correctly in a matter of four or five trials.

Incidentally, the variety, not to say candor, of these students' responses makes one wonder as to the generality of association data gathered on standard college sophomore beginning psychology students.

General Summary

Now, where are we?

We started with an explicit attempt to determine how the rules, the "hypothesis," which the subject "tries out" in operant conditioning and concept formation experiments, operate in controlling his behavior. We wound up, far afield, in word-association experiments. We started with a frank attempt to find out, irrespective of whether it is necessary for conditioning, how verbal behavior operates. We wound up with a new area where "incidental learning" takes place. The results of these experiments justify some tentative generalizations that may prove of use not only in bringing order into some of those areas of human learning where problems of "awareness" have arisen, but also in rendering problem solving and similar complex behaviors amenable to experimental elucidation rather than theoretical elaboration.

I. When a discriminative stimulus is presented to a human subject, it produces, at different probabilities, a very broad variety of verbal responses. Each of these responses is termed a notate. Both the number and specific identity of those which are given overtly will be functions of the specific instructions that are given to the subject. Whether overt or covert, these responses are operants ("voluntary," if you will), and are subject to alteration in both probability of occurrence, and resistance to extinction.

II. The probability of occurrence of a given notate to any one of its stimuli is a function of the numbers of preceding presentations of others of its stimuli. That is, the greater the number of a notate's stimuli that precede a specific one, the greater the probability that the notate will be given to that specific instance. This statement in itself may be no more than a rephrasing of a general law of stimulus summation; with continued presentation, a stimulus that is initially inadequate for a given response may elicit, or release the response.

It follows, then, that the repetition of stimuli that initially do not produce a specific notate overtly, or (as revealed by questioning) covertly, will progressively tend to do so as they are presented following more and more stimuli which also have some low probability of yielding it.

(From this, it also follows that the instruction of a human subject in a given experimental situation will eventually lead him to respond systematically to initially "unnoticed" features of the environment. For example, if he gets "conditioned," he will almost necessarily notice it. Similarly, subjects will sooner or later start "making hypotheses" about features of the experimental setting and procedure which have been eliminated as controls over behavior by being held at constant values, (or so the experimenter thinks).

III. If a notate is stated on one trial, and if a stimulus for the same notate is given on the following trial, the notate is reinforced by confirmation, in the absence of any social reinforcement. A single reinforcement is sufficient to produce some resistance to extinction. If the notate is *correct*, with this one confirmation it reaches its maximal relative frequency with respect to instances of its stimulus class. It is "stuck

in," and continues to be given so long as its stimuli occur.

IV. The effectiveness of reinforcement by confirmation is amplified many times by the experimenter's instructions to the subject, and by the subject's instructions to himself. What was initially a very weak reinforcer becomes, by instruction, an extremely strong one. The subject's certainty, his willingness to bet that he is right, is a simple function of the number of continuous reinforcements.

V. The statements about the environment made by a subject to himself are found to be of two sorts: those which simply describe the environment, but suggest no further behavior (notants), and those provide him with discriminative stimuli for further behavior (monents). The latter are self-instructions, instructions of the subject to himself. They tell him what to do. Most of the time, he does it. Such monents may also be introduced to guide the subject's behavior by statement in the instructions.

The way to determine how a subject's behavior is guided by self-instructions is by the systematic experimental manipulation of instructions either to himself or from another. It is not wise to assume, as is usually done, that a subject will do what he is told to do, whether by himself or by another. Nor does it make sense to assume that, if we but knew the self-instruction, we would know "what the subject is really doing," or "what is controlling his behavior." Such relationships need to be experimentally established. It is encouraging that some aspects of this problem are now being explicitly investigated by Grant (1962), who has found not only some expected results, but some unexpected ones: apparently innocuous or inconsequential alterations in instructions can yield some large, unpredicted, and as yet cryptic quantitative changes in subjects' behavior.

VI. In most experiments on conditioning, problem-solving, and the like, the experimenter follows one rule throughout the experiment. From the foregoing it follows that the subject will almost always "find the rule," even when he has not necessarily been instructed to do so. It will hence be all but impossible, in a highly ordered laboratory situation, when the subject is "in an experiment," to preclude him from finding and stating the rules followed by the experimenter. He need hit the "right" rule only on one occasion for it to become subject to regular reinforcement. Only by devious means, as by distraction, can one expect to prevent a subject from verbally responding to the significant variables of the experiment.

VII. The subject's "certainty" that a rule is correct is a function of the number of continuous reinforcements it has had. Other schedules of reinforcement also increase resistance to extinction, but with another effect on "certainty." (As a subject on 60 percent reinforcement in group PH said in explanation of his behavior, "Well, I knew it wasn't *exactly* right, but it was right *most* of the time, so I stuck with it.")

VIII. Reinforcement by confirmation is imprecise, not well-suited for shaping. The probability that the subject will get the *exactly* correct rule or principle will be determined by the sequence of stimuli given him, and only with precise control of these stimuli can such successful "solutions" be assured. Those experimenters who wish to shape up the correct notate, notant, or monent can do so, but when these verbal operants are allowed to occur covertly, picking up essentially uncontrolled reinforcements, some odd superstitions may occur.

IX. It would appear that whenever a monent is on continuous reinforcement, so that reinforcement is delivered *alike* to monent and the behavior it "directs," it will exert maximal control over the behavior for which it is the predocent.

X. Only by dissociating, in one way or another, the reinforcement of the *monent* from the reinforcement of the behavior controlled by the monent is it possible to show the nature of their relationship. Under partial reinforcement of the *behavior*, the strength of the correct monent becomes weaker than that of the behavior, and under partial reinforcement of the monent,

its strength exceeds that of the motor behavior. The remaining resistance to extinction of the incorrect responses reveals itself in the form of occasional "errors."

Closing Remarks

Where does this all leave us with respect to "awareness?"

"Awareness," as it has been described, seems to have been assigned no particular properties as a consequence of which differential behavior might be expected. It is used rather as a verbal magic that allows one to say that operant conditioning is not operant conditioning, because the subject was "aware." There are alternatives, however.

The burden of the experiments here reported seems to be this: Watson's "verbal reports," and Hunter's "SP-LR's" can be dealt with as can any other behavior. They do not need to be ignored, as they are by some. They do not need to be treated purely as reflecting some other process, some solely inferrable state, whether "mediating process," "consciousness," or "awareness." As relevant behaviors, they can be experimented upon directly. When this is done, these verbal behaviors not only reveal orderliness with respect to both discriminative and reinforcing stimuli like that of nonverbal behaviors, but also they show their function as discriminative stimuli in directing and controlling other behaviors. In this, they show properties that they do not share with simpler motor activities, or with nonsense-syllables. A further, fuller empirical investigation of their quantitative characteristics should, we can state with some confidence, make questions of "awareness" of limited empirical significance. When these relationships are more fully elucidated, the word "awareness" may prove as dispensable as, say, phlogiston.

As an experimental strategy, then, let us remain unaware of awareness, but let us diligently ask the subject what he is or "thinks" he is, doing, and let us, using the methodology that has proven fruitful in showing the order in explicitly nonverbal behaviors, determine how such verbal statements behave, and, in turn, how they are related to—sometimes control—other ongoing activities.

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APPENDIX A

The reader is invited to try out the following on himself, and on other subjects.

Give individual subjects one or another of the instructions in the text, and then present the words in one of the three lists either as ordered, or in reverse direction, or scramble, with an interpresentation interval sufficient to allow the subject to state the notate for each stimulus word. Most revealing, give the subject list A following instructions to find the concept, and then, immediately, with no indication to the subject of a change, present list C in reverse order. This last procedure will often yield, to a single stimulus item following a critical nonreinforcement, several notates in succession, chained into an elaborate "hypothesis,"—a notant.

Word Lists

A	B	C
coffee can	envelope	danger-sign
barrel	post card	blood
bottle	stamp	stoplight
flower-pot	ticket	flare
bowl	magazine	rash
wastebasket	newspaper	fire-engine
cup	dollar-bill	exit-sign
tin can	blotter	brick
oil drum	kleenex	nailpolish
cigarette	shoebox	lipstick
wheel	ruler	ruby
clockface	bulletin board	fir
porthole	cigar box	cardinal
telephone dial	plank	poinsettia
dime	drawer	rose
discuss	desktop	blush
sun	mattres	slips
cake	brick	raw meat
doughnut	trunk	tongue
meatball	U.N. Building	radish
pie	refrigerator	raspberry
orange	chocolate bar	apple
sausage	lump of sugar	cherry
grapefruit	butter patty	beet
macaroni	sandwich	strawberry

APPENDIX B
THIRTY-SOMETHING: A COMMENTARY

The paper now titled Some Verbal "Mediators" is dated, clearly dated. Since its first publication more than thirty years ago, developments in the culture demand some rewriting: the prose clearly predates the degendering of the language. All our subjects, one might infer, were males. They weren't, of course. So, in reading the paper in 1992, please replace each "he" that refers to a subject with s/he. And please accept this belated apology from one who wrote, as did everyone else then, like a male chauvinist pig and an almost-DWM.

But rereading this paper after those three decades, and in spite of the very recent spate of behavior-analytic papers on "rule-governed behavior," I have not needed to (and, hence, did not) change a word __ even to squeeze that term "rule-governed behavior" in somewhere.

With its republication, still further emphasis must be placed on four major points explicitly stated in the paper:

(1) A clear distinction must always be drawn between the rule(s), contingencies, laws, procedures of the environment, whether they are an experimenter's, "physical laws," a policeman's order, or a STOP sign, and the individual's verbal and other behavior in relationship to that rule.

In "problem-solving" and "concept formation," an individual may or may not produce, yield, or emit "hypotheses," or "guesses" — *monents* — in solving the problem or *notants* in finding a concept. The problem is "solved" or the concept is "found" when the subject's monent or notant corresponds to, or is a paraphase of the environmental rule.

Both monents and notants are operants. Like other operants, they are contingency-shaped and contingency-controlled. They are subject to reinforcement, extinction, and manipulation by partial reinforcement, whether by experimentally programmed contingencies, or by *confirmation*, which acts no differently than a "right," or a light that indicates a response acceptable to an experimenter.

(2) Monents, which specify to the individual who states them, whether overtly or covertly (Skinner's "listener") what to do, can be experimentally investigated independently of the response they specify only if the "solution" to the problem being

solved can be changed while the subject is working on it. When this can be done, then, and only then can the experimenter differentially reinforce the stated monent, and the response or responses the monent instructs its speaker to do.

Sorting of playing-cards according to what is on their backs enables such changes-in-solution to be carried out readily. The notates and notants, the "concepts" investigated using stacked decks of cards, and lists of words do not specify any behavior to the subject, and cannot be used to distinguish between the contingency-controlled notate and other behaviors.

(3) These researches on human "thinking" and "problem-solving" can be carried out easily, in almost any context, if suitable stimulus material is available. The stimulus material we used is interesting to Ss, although devoid of artistic merit, and Ss enjoy doing their job. The behaviors are robust; clear-cut results emerge without benefit of the usual apparatus or "experimental controls," Since subjects are assured that the problem can be solved, they always wind up on a schedule of regular reinforcement.

(4) The gradual processes of discrimination-learning, as developed by Hull and Spence from Pavlov's early work on conditioning, can be demonstrated by these methods. But Pavlov abandoned these studies and moved onto work on "The Second Signal Systems," to wit, language, which shunts across the "First Signal System," but does not displace or replace it. "Getting the solution," i.e., stating the monent that yields 100% correct response rates, does not cancel out the relative response strengths of the responses involved prior to "solution." This methodology permits the recovery of such rates in extinction curves generated after a first solution to the problem has been changed.

In stressing the difference between a rule of the environment, which Skinner defined as a "contingency-specifying stimulus," and a *monent*, which is stated by the individual reflexively (i.e., to himself or herself) in "solving a problem," "finding a concep,t, or, indeed, in working to stop smoking or in making "New Year's resolutions," emphasis is placed on the empirical finding that such self-stated rules are themselves fully controlled by the environmental contingencies of stimuli presented, and of the consequences produced, and that such "rules," *monents*, are not necessarily controlled by the contingencies specified by the rule. Moreover, the individual may behave systematically congruently with the rule (as defined by Skinner), but be unable to state it: s/he may not "know" the rule; s/he may be unaware of it, be unable to "figure it out."

It is, then, necessary to distinguish clearly between two behaviors — *conforming* and *complying*. When one *conforms* with a rule, one behaves consistently with a rule as defined by Skinner, even though one may be unable to state it — or even state an approximation to it. When one *complies* with a rule, one both *conforms* with it, and *can state the rule* both to others and to oneself; ones *monent* states the contingencies of the rule. For a fuller discussion, see the definitions (with commentary) that appear in the behavioral Glossary/Thesaurus that has been in preparation through the cognitive years, and is now nearing completion. (The G/T is written so as to be comprehensible to those who have no background in the language of the experimental analysis of behavior, and, indeed, may be hostile to it.)

One line of research that must be pursued is investigation of the variables that determine whether the individual will comply with one or another of his or her own monents. One master's thesis showed that when subjects had been conditioned solely with social reinforcement (no dimes, no exchangeable points), many stopped responding shortly after stating a monent that corresponded with the rule the experimenter had been following (complying with) in conducting the experiment. Later, in a one-subject experiment, this writer rigorously complied with monents related to smoking cigarettes. Following the contingencies he stated to himself, he succeeded in dropping from a five pack a day habit to no cigarettes a day — in three days. It was a full-time job; no distractions from the

repeated systematic statement of the crucial monent with each of the activities related to cigarettes were permitted.

This writer is impressed by most of the recent work on "rule-governed behavior" such as those reported in Steve Hayes' book *Rule-governed Behavior*. Much of it, however, is an excellent example of the diligence with which behavior-analysts interpret into a language acceptable to them research done in other contexts and reported in other vocabularies.

Interpretation will not replace investigation — *experimental* investigation.

The writer asserts without hesitation that the present vocabulary (see appendix C) and methodology will clarify and render accessible to research almost all, if not all, of the investigative problems and "cognitive" phenomena dealt with under the rubric "ruled-governed behavior."

Some Notes on History

The attached bibliography summarizes, to the best of my knowledge, the first experimental research done on specific "cognitive" problems of human behavior from the behavior-analytic point of view. The research "program" began in 1954, at about the same time I was doing the ground-breaking work reported in "The Operant, From Rat to Man" (1955), and, with Cody Wilson, explored the "Greenspoon effect," the first clear-cut operant research on human behavior. The data in this paper clearly showed the behaviors eventually termed "notants." Read it. As a student of Kenneth Spence at U.Va., and a fierce Hullian at the time, I was a proponent of "conditioning principles" applied to concept formation, in opposition to Krech's Tolmanian concept of "hypotheses" in rats. Later exposure to, and assimilation of, the very different conceptual and experimental views of Robert Kantor and Fred Skinner had led me into the investigation of the operant-conditioning of human subjects. Given this, and the results reported in Wilson and Verplanck, (1956), it was, then all but inevitable that I should deal with discrimination and "concept" formation as a functional behaviorist, committed to a naturalistic base.

Wilson's results, together with the ease with which observers "caught on" to the response being reinforced, even when the subject, although conditioned, did not observe (was unaware of) it himself or herself, demanded investigation. So, I started running through a series of informal "experiments," with students, secretaries, and whomever as subjects, asking them to sort cards into two stacks, one class belonging on the right, the other on the left. I'd tell them whether they were "right" or "wrong" on each placement. I didn't ask them to tell me what they were "thinking," but they usually talked anyway. And I listened, a form of observation neglected by experimental psychologists. I progressed through a series of sets of stimulus materials — from Weigl cards to playing cards (number, color, suit, face-card, etc.) — and found that all, including a hypothetical set I worked out, simulated the "concept-formation" materials most often used, and that all provided a very limited set of possible "concepts," and of rules for reinforcement that could be followed. Using schedules of reinforcement, as Catania did many years later, was no better. Full exploration of the procedures that could be followed, and hence of the processes that would show themselves was impossible.

I've no recollection of when it occurred to me to give up using the faces of the "professionally correct" Bicycle playing cards, and start using the varied and inventive backs of the cheap ones used by amateurs. I started asking for, and then buying, kids' (and then adults') collections of playing cards. (I now have some 3,000 of them, with very few duplicates.) This opened the gates: border-no border; single vs. plural principal character; animate-inanimate, and so on. And on. Any one, or combination, of an all but infinite set of concepts could be chosen as the basis for the experimenter's rule for reinforcing placement to the right or left. And listening to subjects, as they worked toward "100% correct," and to myself as I made up those

rules, led to exploration of the possibilities opened by asking the subject to state what he or she thought was the rule that would enable them to get all their placements correct.

Subjects could now be reinforced on the basis of the placement contingency, or on the basis of the "rule" contingency. More importantly, the work demonstrated that the terminology in which the research was planned, conducted, and reported needed improvement. A clear distinction had to be made between the *rule* followed by the experimenter, and the verbal statements, the *monents*, stated by the subject with placements overtly, either immediately or following a probe question. Hence, *notates*, *notants*, and *monents*. Why not "hypotheses" rather than *notants* and *monents*? That term, I believe, is too embedded through facile associative relationships in the nonbehavioral vocabulary of cognitivism. The remarkably straightforward orderliness demonstrated in these researches should not be obscured by the choice of words whose connotation would obscure clear thinking.

And *notates*? Why not Skinner's "tacts"? Well, both notates and notants are tacts, and monents are self-delivered mands, but here too, these terms were embedded in a larger *interpretative* rather than experimental context. Notates, then, are the words used in description; descriptions are notants, strings of notates. Notates are the word-associates given by individuals to things and events they observe. And if what they observe is a written or spoken word, then the primary notate is the word read or heard itself, as Deese found, and as our data confirm. Hence, the relationship of this first paper to the work on the Word Associate Test that follows.

Shortly after this paper was presented, Don Dulaney, a good cognitive type, persuaded that "Man" (as one termed the human species in those days) was a rational animal. He simply didn't believe the data, and asked if I would send him the deck of 110 cards we had used in the first research (Verplanck and Oskamp). I did; he repeated the experiment and got the same results.

His faith in the rationality of "man" led him then to review each card placement with his subject or subjects. As I recall, he found that for those cases on which the S placed the card in accordance with the placement contingency, but continued to state the monent that was now on partial reinforcement, the subject was able to find a "reason" for the discrepancy, to find a feature of the card which he or she used to justify the placement.

He decided then that he'd shot the whole business of "learning without awareness" down in flames — and, of course, he didn't get some cards himself, (or find other materials) and carry on further investigation.

His technique of requiring an "explanation," in my judgment, stands as an outstanding (if not the first) experimental research on what Freud called "rationalitation." In the *Family Circus*, that excellent psychologist Bil Keane has Jeffie plaintively ask his bemused mother, who has found him running-jumping in circles, bouncing off the walls in a corner of the living room, "Do I have to have a reason?" Yes, Jeffie, in this culture you do. Yes, Don, in this cognitive culture of yours, every college student has to have a "reason."

The experimental pressure on subjects to conform with a cognitivism that accepts the subject's statements as directly reflecting as causes of behavior rational "mental" activities, coming at the time when the "cognitive revolution" was coming into full swing persuaded me that the time was not ripe to pursue for publication these researches. Mark Rilling's Master's Thesis at the University of Maryland, done before he went on to the doctorate at MSU, was the last research explicitly on this topic, and thereafter, I decided in all this research I would have to sit out the "cognitive revolution," waiting until it was played out. That time has come, as the cognitive revolution now is joining the USSR in disintegrating.

So, sit I did, even as a Nobel Prize was given to a man whose primary work was based on the premise that the human individual

observes and can report accurately the processes entering into his behavior: "thinking."

The methodology and concepts emerging did not disappear, however. The work on "word associates" as a method for finding out how much an individual knows emerged directly from this work. The first notate yielded by the stimulus term is the term itself. The first word written down is the first associate — single words or terms which, with some interesting exceptions, show up in what subjects write when they are asked to write a short answer — a brief paragraph — on what they know about the concept named by the term. These data also showed that, in the study of concepts, one must sharply distinguish between *social* or *group* concepts, which appear in the distribution of responses given by numbers of individuals, and the concepts of any one individual.

This is a distinction parallel to, and equally as important as, the distinction between *rules* and *monents/notants*, and between *conforming* and *complying*.

"Education" can then be seen as the means whereby a culture seeks to ensure that its rules and group concepts become part of the repertory of each individual in that culture.

As a good Hullian, even though I had been exposed to Skinnerian thinking at Brown, I learned a good deal while working elbow to elbow with both Skinner and Kantor at Indiana. As the then unreconstructed Hullian, I intensively studied Fred's writings, and summarized his position as I saw it. Its strengths persuaded me that his behavioral system was a more effective context in which to work than was Hull's. Through five years at Harvard, still working closely parallel to him (not on the problems he and his collaborators were then investigating), I came to understand better Kantor's contributions—and found the relationship of both with the methodology and some of the concepts of ethology. The net result, a Glossary, and several papers in which my students and I reported a variety of studies on human behavior; the data were collected under naturalistic (i.e., not "rigorously experimentally controlled") conditions. Repeated comparisons of these results with the results of research on human behavior (especially "cognitive problems," e.g., "thinking," "memory," "perception," etc.,), taken together with the development of a method for analyzing the operations carried out in an experiment, and the relationships of those operations to theory, led to a reevaluation of the methods that psychologists (including behavior analysts) have most often pursued. By a nice coincidence, the first of those two papers appeared in the same year that Robert Kantor addressed Div. 25 of APA, which had the ironic results that his unique and invaluable contributions to the science of behavior were subsequently neglected, even as his suggestions for the future were progressively followed, as evidenced by the surge of research exemplified by the Association for Behavioral Analysis, not to say, that summarized in Hayes' book on rule-governed behavior.

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APPENDIX C
THIRTY-SOMETHING: A GLOSSARY

New Terms
(and clarification of the usage of familar terms)

notate: a verbal operant; a word or phrase stated reflexively ("to oneself") either spoken overtly or unspoken covertly, or to another when probed (asked), specifying what the individual is observing or has observed.

notant: a verbal operant; two or more notates specifying (describing) what the individual is observing or, when probed, has observed at some time previously. Some notants ("bridges") are phrases that state a relationship between notates. [e.g., "The *book* is *to the right of* the *lamp*." The underlined terms are *notants*.]

predicant: junk this word... unnecessary.

shred: statement of a notant that may or may not be accepted as a "grammatical" sentence; a sentence fragment. [The bane of English teachers, and until Hemingway, of literary critics.]

predocent: a verbal operant; a word or phrase stated instructions to oneself ("reflexively"), either spoken ("overtly") or unspoken ("covertly"), or reported to another to carry out a specific response. ["Stop," "Start," "Go there," "Pick it up," "Put it to the right."]

monent: a verbal operant; a self-instruction to carry out a specific response when presented with a stimulus that controls a specific notate. [i.e., first notate then predocent. A reflexive mand.]

concept: a broad class of stimuli that control a concept-set. [Concepts are usually, but not necessarily, *notates*; the individual may not be able to *state* the contingency either to him or herself or to others — that is, s/he may be unaware of the stimulus-class that is controlling what s/he says or does.]

concept-set: a broad class of varied responses, instances of which are controlled by a concept. [The concept-set of "Skinner-box" of any one individual is everything s/he has ever done or is doing with a Skinner-box. In word-associate tests (or games), the individual's concept-set is the full set of associates given to a word or phrase that is read or heard. The concept-set of a specified group of individuals is the full distribution of associates given by all members of the group to a word or phrase. "Education" may be viewed as socially controlled procedures carried out to ensure that the concept-sets of individuals are congruent with one another.]

APPENDIX D: THIRTY-SOMETHING: EXTRACTS FROM THE GLOSSARY/THESAURUS

(not yet subjected to final editing)

1-13.04.03.020 1-conform

(1) to demonstrate the behavior or sequence of behavior predicted in an experiment by an experimenter's rule when there have been no instructions.

(2) more broadly to demonstrate the behavior or sequence of behavior prescribed by a social norm within a specified group, community, or culture, or by a physical law or a behavioral law. **04.01.02.000, 04.02.05.060, 04.05.01.000, 13.04.03.020, 13.16.01.070, 13.16.03.050** *See* **comply;** *cf.* **super-ego.** *In all these cases, the individual may or may not be able to state the experimenter's rule, the behavioral law, or the social norm with which he is conforming. He may be able to state a rule or law, and not necessarily conform with it. "Knowing" the rule or law, and conforming with it are two quite different behaviors.*

Other variables that control behavior may lead him to "make errors," "reconsider an interpretation," and the like. If people always conformed with their monents, there would be no need for words like "carelessness," "insincerity," and "hypocrisy."

The diversity of variables that control conforming and failing to conform, not to say of the behaviors that do or do not appear, has tended to obscure similarities, and to ensure minimal research — piecemeal, scattered, and asystematic consideration of the variables.

"Not conforming" covers anything from picking ones nose in public, using bad grammar, being institutionalized as a dangerous paranoid schizophrenic, or as a marijuana-smoker, to being an artistic genius, a revolutionary, or to committing suicide (whether for

political idealism or for personal reasons). Seldom indeed does it correspond with non-complying. (Historically, the British Nonconformists were behaviorally noncompliers.)

For a start, it might be helpful to point out the need to distinguish among many classes (not necessarily mutually exclusive) of failing to conform when the biography of a subject, or the social behavioral repertories of members of the community or group within which s/he grew up, would lead to the prediction that s/he would conform. These three are congruent with some concepts that have appeared or developed in other social sciences; in all applications they demand descriptions of the individual, the group, and the behaviors that are not nonconforming.

The three are: (1) nonconforming, refusal to conform. This can be determined by probe questioning, if the subject does not point-blank assert that he is refusing. The subject is able to state the social norms (the social behaviors that he does not demonstrate) as a monent. ("This is what I should be doing; it's what they want me to do. I won't"). Nonconforming may be related to a single behavior of an individual, or of members of a group, or to so broad and diverse a set of a group that it defines a counter-culture. In nonconforming, the individual, or the individuals of a group can identify both the behaviors and the group whose behaviors they do not conform with, and may refer to themselves (and be referred to by others who identify with them) as "alienated." See also **anomie**.

Nonconforming individuals tend to write and talk a great deal, and to tell you all about the groups and the behaviors (norms; values) they do not conform with but can and do offer and demonstrate alternatives.

Failures to conform diverge in all possible ways from this "basic" non-conforming; and both the terminological and theoretical possibilities for hypothese are overwhelming. There is the convict who conforms with the social norms of the prison population, the social revolutionary who restricts his nonconformance to rewriting Das Kapital; the crazy-mixed-up products of the double-bind; the executive who seeks out lawyers whose advice will be dishonest. A whole range of behavior falls here, from great artist to great psychopath.

Included are not only the failures of an individual to conform with his group, but also for a community to conform with the behavior of a still larger group, of which it is a member, which may be based on the lack of opportunity to acquire parts of the behavioral repertory of the larger. When the subgroup is geographically remote from its reference-group, the term "cultural lag" is applicable. When the two groups are removed from one another in the times when their repertories were acquired, the term "generation gap" applies. "He doesn't know any better," is not too far from "they don't have TV in this country yet."

In using the terms "conform" and "nonconform," we emphasize that they must always be carefully and fully qualified, with descriptions of the behaviors that are conforming or not, and of the rule, law, or social norms (defined by the group with which they are considered).

These terms explain nothing. As given. They describe nothing. They point out a set of problems that may be fruitfully considered together, when the abstraction is replaced by a full statement on both behaviors and the individuals or groups.

1-13.04.03.010 1-comply

(1) to demonstrate the sequence of behaviors specified in an instruction or request presented as a stimulus to the individual by an experimenter or by any other individual (mother, employer, teacher, policeman) who states them to him/her, or presents him/her with a record of them. **13.03.05.03, 13.04.03.01, 19.07.06.01, 20.02.03.04, 20.04.04.01** *If the instructions are clearly stated, and not too complicated, the complying may be accurate and acceptable. The subject may comply incompletely or inaccurately without having refused to comply, or with no plan of refusal. S/He may fail to comply because s/he has come up with some instructions of his/her own. And again, s/he may simply refuse (see* **negativism;** *and* ***oppositional behavior****).*

Complying is demonstrated in an experiment when a subject's behavior comes into systematic orderly relationship with the set of experimental or other operations as they are specified in the instructions given to him/her. The subject in an experiment who fails to comply will

usually have the instructions reread to him/her, or the instructions may be rewritten, or they may be restated in paraphrase until the subject does conform with them. Experimental research indicates that subjects are more likely to conform with their own self-instructions (monents; "hypotheses") than to comply with the experimenter's instructions.

(2) more broadly, to demonstrate—carry out—the sequence of behaviors specified in a rule, instruction, order, prediction, threat, legislated law, or demand that has been explicitly presented to the individual. *This verb takes an object; its nominalization, "compliance" requires a qualifying phrase. In short, the term cannot be used without statement of the rule, request, or law on which the individual complies. Such a statement must not only have been made to the individual, but it is required by the observer if he is to identify the complying behaviors when and if they occur.*

Complying is distinguished from conforming by the explicitness of statements to the individual of the behavior specified or planned by the individual or organization giving the instruction. You comply with an order, or with a threat.

Refusal to comply (noncomplying) can be distinguished from the absence of complying (uncompliance), which is sometimes attributable to sheer inability to comply with an impossible demand. The conditions under which complying does not occur differ greatly from occasion to occasion, and from individual to individual, which is perhaps why psychologists have approached these problems in so erratic and evasive a manner. They have, by and large, left them to sociologists and anthropologists. Cf. **conform; nonconformance.**

The full range of failing to comply goes from simple misunderstanding, through unwillingness to do favors for some individuals, oppositional behavior, and negativism, over to some of what legislators and the press term "crime." Including complying ("compliance") in this glossary not only states the occurrence of complying behaviors; but it emphatically presents them as a set of problems that need more careful investigation than they have had.

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[6]The printed text of this paper on the interactions of J. R. Kantor with B. F. Skinner, and on the groundbreaking contributions of the former to the sciences of behavior is replete with egregious typographic errors, many of them grievously altering the contents of the paper. A corrected copy can be obtained by writing the author.